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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

MOUTTET, BLAISE L

ART UNIT	PAPER NUMBER
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2853

DATE MAILED: 02/15/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/628,661

Applicant(s)

KAWATOKO ET AL.

Examiner

Blaise L Mouttet

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 January 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-33 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 July 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 9.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Drawings

1. The examiners objection to the drawings contained in the prior office action is withdrawn in view of applicants comments in paper no.10.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 3, 7, 11, 12, 14, 18, 22-27 and 29-32 are rejected under 35 U.S.C. 102(b) as being anticipated by Stephany et al. US 5,497,174.

Stephany et al. discloses, regarding claims 1 and 12, a printing apparatus and printing method comprising:

discriminating means (46, 48, 50, 52) for performing a discrimination step of determining the number of simultaneously driven printing elements of a plurality of printing elements when printing data is printed (column 3, lines 46-60, column 5, lines 46-49);

determining means 46 for determining a fundamental pulse width on the basis of driving conditions according to a condition of the printhead (column 5, lines 31-36, column 6, lines 19-39); and

control means 54 for performing a control step for controlling a drive pulse to be applied to printing elements used in the printing of the printing data, on the basis of the fundamental pulse width changeably determined on the basis of driving conditions of the printhead and the number of simultaneously driven printing elements discriminated by the discriminating means (column 5, lines 50-60, column 6, lines 19-39, 57-63).

Stephany et al. discloses, regarding claims 3 and 14,
storage means 46 for storing a first look-up table (management table) for managing the correspondence of the driving conditions with the fundamental pulse width (column 6, lines 19-39), a second look up table (management table) for managing the correspondence of the fundamental pulse width with a change amount of the fundamental pulse width based upon the number of simultaneously driven printing elements (column 5, lines 31-44); and

second determining means 48 for determining a change of the pulse width in accordance with the look up table (column 5, lines 45-60),

wherein said first determining means 46 determines the fundamental pulse width using the first look up table (column 6, lines 19-38), and

said control means 54 changes the fundamental pulse width determined by said second determining means to generate a driving pulse to be applied to printing elements used in the printing of print data (column 5, lines 49-60).

Regarding claims 7 and 18, the driving pulse, which increases as the number of simultaneously driven ink ejecting resistors increases (column 5, lines 47-49), experiences a decrease when the number of simultaneously driven ink ejectors exceeds

a predetermined value (see column 7, lines 7-12 which explains that the output of the thermistor 60 determines the predetermined value). The examiner notes that it is inherent that an increase in the number of simultaneously driven ink ejectors increases the temperature of the printhead since each ink ejector driven converts electric energy to thermal energy (see column 6, lines 43-51 of Stephany et al.).

Regarding claims 11 and 22, the printhead is an ink jet printhead (column 2, lines 8-10).

Regarding claim 23, program codes for the discriminating and control steps are inherent since these steps are performed by ROM (44) and ink jet logic (54).

Regarding claims 24 and 29, the fundamental pulse width is selected and determined from a plurality of pulse widths (column 5, lines 31-37).

Regarding claims 25 and 30, the driving conditions include printhead characteristics including the temperature and the position of the resistors on the printhead (column 6, lines 57-63).

Regarding claims 26, 27, 31 and 32, Stephany et al. discloses that an index value (in increments of 1/8 of a microsecond) is formed representing a change in fundamental pulse width based on the number of simultaneously driven print elements (column 5, lines 31-37) and that the value of this index which modifies the pulse width is based upon printing conditions stored in a look up table (column 6, lines 19-39).

Claim Rjections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 2, 6, 13 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stephany et al. US 5,497,174 in view of Corrigan et al. US 6,183,056.

Stephany et al. discloses that the driving conditions include a wiring resistance, heater resistance and environmental temperature of the printhead (column 3, lines 3-8, column 6, lines 57-63).

Stephany et al. fails to disclose that the driving conditions include a driving turn on resistance or that power lines for sending power to a plurality of printheads are individually controlled.

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Corrigan et al. teaches using a turn-on voltage to calculate the pulse width sent to a set of ink jet firing resistors (column 2, lines 4-12), teaches that the resistance of print cartridges varies between separate print cartridges (column 1, lines 49-67) and teaches providing separate control lines between separate quadrants of an inkjet printhead (column 2, line 61 - column 3, line 3).

It would have been obvious for a person of ordinary skill in the art at the time the invention was made to include a driving turn on resistance as one of the driving conditions in the method and apparatus of Stephany et al. to calculate the pulse width as taught by Corrigan et al.

The motivation for doing so would have been in order to compensate for the turn on characteristics of the printhead of Stephany et al. as taught by column 2, lines 4-12 of Corrigan et al.

It would have been obvious for a person of ordinary skill in the art at the time the invention was made to individually control separate power lines going to separate print heads in the apparatus of Stephany et al. as taught by Corrigan et al.

The motivation for doing so would have been in order to compensate for variations between separate printheads as taught by column 1, lines 57-62 of Corrigan et al.

4. Claims 4, 5, 10, 15, 16 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stephany et al. US 5,497,174 in view of Nagoshi et al. EP 626 266.

Stephany et al. fails to disclose, regarding claims 4, 5, 15 and 16, that the fundamental pulse width is defined by one of leading and trailing edges.

Stephany et al. fails to disclose, regarding claims 10 and 21, that predischage is performed.

Nagoshi et al. discloses forming a pulse width for driving an ink jet print head from a pre-ejection pulse (P1) and an ejection pulse (P3) as shown in figure 15, that the pulse widths are defined by leading and trailing edges (figure 33) in which a management table is stored for controlling the pulse widths on the basis of drive conditions (figures 30-32).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to include a predischage pulse in the pulse disclosed by Stephany et al. and define the pulse by the leading or trailing edges as shown by Nagoshi et al.

The motivation for doing so would have been in order to better control the temperature of the inks used in the printhead of Stephany et al. as taught by page 11, line 52 - page 12, line 7 of Nagoshi et al. so that the droplet size is stable at elevated temperatures which is a motivation disclosed in column 2, lines 17-19 of Stephany et al.

5. Claims 8 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stephany et al. US 5,497,174 in view of Wysocki et al. US 5,223,853.

Stephany et al. discloses that the temperature in the printhead is directly related to the number of simultaneously firing resistors and that this requires adjustment of the firing pulse width (column 6, lines 43-52).

Stephany et al. fails to disclose increasing a change amount for the driving pulse width when the number of simultaneously driven printing elements is less than a predetermined value.

Wysocki et al. teaches increasing a driving pulse width for an ink jet printer as the temperature of the printhead decreases as shown in figure 2B (column 3, lines 9-16).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to increase a change amount for the driving pulse of Stephany et al. as shown by Wysocki et al. when the number of simultaneously driven printing elements decreases below a predetermined value.

The motivation for doing so would have been to obtain a dot of desired size on a copy sheet as taught by column 4, lines 53-65 of Wysocki et al. and column 2, lines 17-19 of Stephany et al.

6. Claims 9 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stephany et al. US 5,497,174 in view of Ebisawa US 5,289,207.

Stephany et al. fails to disclose making a pulse width used for predischARGE for recovering said printhead larger than a pulse width of a driving pulse used for printing.

Ebisawa teaches applying a pulse width during a recovery predischARGE larger than a pulse width during printing to increase discharge energy during recovery (see abstract, column 6, lines 13-15).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to make the applied pulse width during predischARGE larger than the

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applied pulse width during printing in the method and apparatus of Stephany et al. as taught by Ebisawa.

The motivation for doing so would have been to perform a recovery operation for the printhead that would enable a longer lifespan for the printhead as taught by column 2, lines 26-30 of Ebisawa.

7. Claims 28 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stephany et al. US 5,497,174 in view of Courtney US 5,610,638.

Stephany et al. discloses that various look up tables can be formed based on printing modes to determine the change of pulse width in order to maintain a normal drop size (column 6, lines 19-39).

Stephany et al. fails to show that one of the print modes used to determine the change in the pulse width is a mode for determining printing complementarily in accordance with a printing pass count.

Courtney discloses using a single pass mode or a double pass mode for an ink jet printhead in order to maintain a normal drop size (column 2, lines 31-52).

It would have been obvious to a person of ordinary skill in the art to include a single pass and double pass mode as shown by Courtney as one of the printing modes disclosed by Stephany et al.

The motivation for doing so would have been in order to better control the ink drop size which is a common motivation of Stephany et al. (column 6, lines 21-22) and Courtney (column 2, lines 31-33).

Response to Arguments

8. Applicant's arguments filed January 29, 2002 have been fully considered but they are not persuasive.

The applicant has argued that Stephany et al. fails to disclose controlling the driving pulse based on a fundamental pulse width determined on the basis of driving conditions according to a condition of the printhead and the number of simultaneously driven print elements.

The examiner disagrees.

It is clearly brought forth in column 3, lines 3-8 and column 6, lines 19-63 of Stephany et al. that the temperature of the printhead, wiring and heater resistances, position of the heating elements and the number of heating elements fired are all elements which are used to control and adjust the driving pulse as explained in the applied rejection.

Due to applicant's further amendment of dependent claims 9 and 20 to refer to "predischARGE for recovering said printhead" as opposed to "predischARGE of said printhead" it was necessary for the examiner to change the applied rejection of these claims so as to rely on Ebisawa US 5,289,207 instead of Anderson et al. US 6,116,717 since the predischARGE pulse of Anderson et al. is utilized for preheating and not for printhead recovery.

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Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Blaise Mouttet whose telephone number is (703) 305-3007. The examiner can normally be reached on Monday-Friday from 8:30 a.m. to 5:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John E. Barlow, Jr. Art Unit 2853, can be reached on (703) 308-3126. The

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fax phone number for the organization where this application or proceeding is assigned is (703) 305-3432.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Blaise Mouttet February 11, 2002

BM 2/11/2002


John Barlow
Supervisory Patent Examiner
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